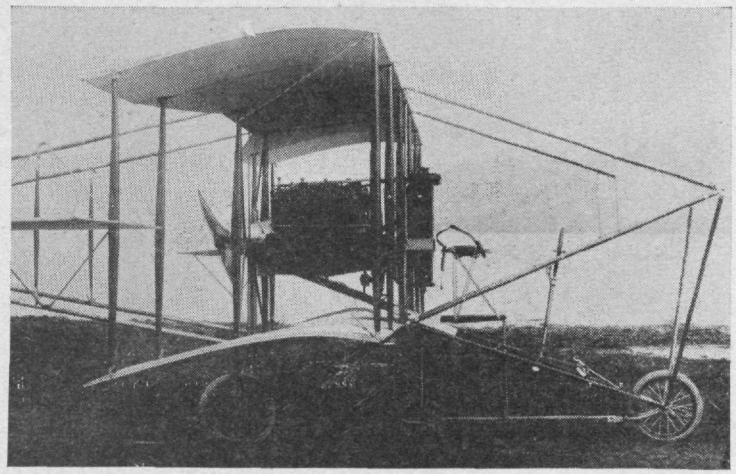
THE "TRICYCLE" FLIES AGAIN!

By PAUL GUSTAFSON

Editor's Note: In this article, mention is made several times of the "three-wheeled" landing gear. This means a landing gear consisting of one wheel at the nose of the plane and two wheels back of the center of gravity; it should not be confused with the "two-wheeled" landing gear, consisting of two wheels at the front, and either a skid or a small wheel at the tail.



Curtiss "Tripod" Popular Aviation

THE main topic of conversation among aviation enthusiasts these days is the "tricycle" landing gear, which seemingly overnight has won either the interest or the favor of leading aeronautical engineers. Yet the origin of this supposedly recent development can be traced back to the time of the old Curtiss pushers, which were named "tripods," from their three-wheeled type of landing gear.

Most of the airplanes built between 1910 and 1915 were of the pusher type, the pilot sitting in front of the motor with nothing between him and the breeze but his flying togs. It undoubtedly eased his mind to see a sturdy nose wheel below and several feet in front of him, secure in the knowledge that a nose-over was next to impossible. This, and the fact that the two rear wheels were situated under the heaviest part of the airplane—the motor—made the tripod landing gear a natural choice for pusher airplanes.

The World War saw the pusher airplane give way to the tractor, and with the pusher went the tripod landing gear. In selecting a landing gear for the tractor airplane, designers must have decided that one wheel at the nose was not sufficient to withstand the landings of heavy, fast warplanes while supporting the greater percentage of weight. Another important factor which must have influenced their decision was the adaptability of the landing gear to a shock-absorbing system. The use of a two-wheeled landing gear made this problem comparatively simple. The axle and struts, fastened with shock-cord, permitted the struts to spread outward and the wheels to spring upward. A wheel, or in most cases a skid, was placed at the rear of the fuselage to take up shock and protect the tail assembly. Use of the two-wheeled type of landing gear soon became standard practice, and today most airplanes are equipped with it.

Stearman-Hammond "Y"

Popular Aviation

It wasn't until three years ago that the tricycle landing gear made its second bid for recognition, coming, as it had gone, with a pusher airplane. This was the Hammond "Y," a low-winged pusher of unique design, which won the Bureau of Air Commerce competition for a safe, economical, and easy-to-operate airplane. The Hammond landing gear bears little resemblance to the multi-strut, spoke-wheeled affair that was its ancestor. There are three separate units, each one consisting of an airwheel, a streamlined housing, a wheel fork, a hydraulic shock absorbing strut with an 18 inch travel, and a fitting for anchoring the strut. As all wheels are equipped with brakes, and the nose wheel is steerable, the problem of taxiing is greatly simplified. The landing gear is capable of absorbing the shock of a six-foot vertical drop.

A number of advantages of the three-wheeled landing gear were revealed when the Hammond was tested. Nosing over is practically impossible. The brakes can be fully applied after landing at twice the normal landing speed. Landings can be made with absolute safety by shutting off the motor and allowing the ship to settle to the ground in its normal glide. It will not bounce after landing, for when all wheels

Waco "N"
Three-quarter Front View

Aero Digest

are on the ground, the wing is at zero degrees angle of attack, and is not contributing much lift.

The second airplane in recent years to employ the tripod landing gear is the Waterman "Arrowplane," another of the ships designed to enter the Bureau of Air Commerce competition, and the first to be awarded a development contract.

The Waterman is a pusher airplane of the "tailless" type. The wing is attached to the sides of the fuselage and sharply swept back. Vertical control surfaces resembling rudders are situated at the wing tips. The rear landing gear struts project outward and downward from the fuselage, but in other respects the landing gear is similar to that used on the Hammond "Y." The newest model of the Waterman has detachable wings, a steerable nose wheel, a gearing system whereby engine power can be shifted from the propeller to the rear wheels, headlights, and a horn. In about three minutes this versatile craft can be transformed from an airplane to a three-wheeled auto which can do seventy m. p. h. on the highway. This performance is added proof of the extreme practicability of the tricycle landing gear.

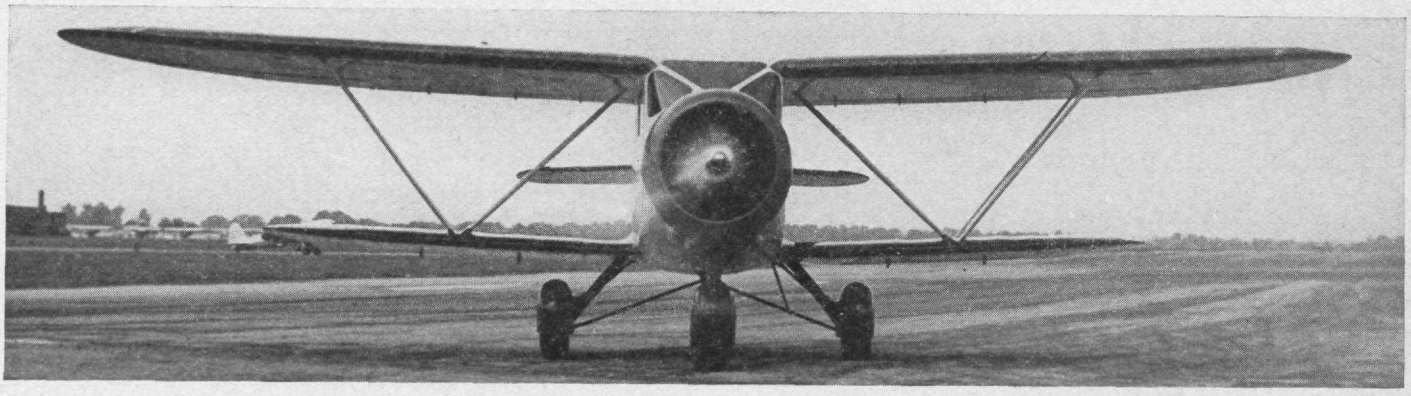
The first modern airplanes of tractor type to incorporate the three-wheeled landing gear in their design are the Waco Series "N," and the Gwinn Aircar, both of which were presented to the general public for the first time at the 1937 National Air Races.

With the exception of the landing gear, the Series "N" has the typical Waco lines. The nose wheel is situated below the engine cowling, while the rear wheels are beneath the lower wing, well back of the center of gravity, allowing plenty of "spread" for stability on the ground. The Waco "N" landing gear has demonstrated the same inherent stability that all tricycle landing gears possess. When it has been landed with the rear wheels fully braked, it simply slides to a stop. The ship will settle to a normal taxiing position on all wheels from widely varying landing attitudes, and by braking one wheel may be turned while taxiing with perfect safety.

The tricycle landing gear moved into a higher plane of respect when it appeared on drawings of the Douglas DC4.

This super-transport, now nearing completion, will have four engines putting forth a total of five thousand horse-power, a wing span of 138 feet, a gross weight of thirty tons, and accommodations for forty passengers and a crew of five. If the tricycle landing gear passes the tests on this great ship, there should be ample justification for saying that it has come back to stay.

Waco "N"
Front View



Aero Digest

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ABC in set-up

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